



Threat processing in generalized social phobia: An investigation of interpretation biases in ambiguous facial affect



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ABSTRACT

Facial affect is one of the most important information sources during the course of social interactions, but it is susceptible to distortion due to the complex and dynamic nature. Socially anxious individuals have been shown to exhibit alterations in the processing of social information, such as an attentional and interpretative bias toward threatening information. This may be one of the key factors contributing to the development and maintenance of anxious psychopathology. The aim of the current study was to investigate whether a threat-related interpretation bias is evident for ambiguous facial stimuli in a population of individuals with a generalized Social Anxiety Disorder (gSAD) as compared to healthy controls. Participants judged ambiguous happy/fearful, angry/fearful and angry/happy blends varying in intensity and rated the predominant affective expression. The results obtained in this study do not indicate that gSAD is associated with a biased interpretation of ambiguous facial affect.

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1. Introduction

Generalized Social Anxiety Disorder (gSAD) refers to a highly debilitating condition with an early onset, chronic manifestation, and high comorbidity with other psychiatric illnesses (Bruce et al., 2005; Stein et al., 2007; Stinson et al., 2007; Acarturk et al., 2008). Cognitive models of social anxiety postulate that an enhanced processing of negative social information may be the key mechanism contributing to the maintenance of the disorder (Clark and Wells, 1995a, 1995b; Rapee and Heimberg, 1997). In line with this assumption, a wealth of studies has demonstrated that gSAD is associated with an altered processing of social threat (e.g., faces signaling disapproval or hostility) in different stages of information processing. For instance, socially anxious individuals have been shown to exhibit a stronger neural activation in response to presentations of angry faces (Ball et al., 2012; Stein et al., 2002; Straube et al., 2004, 2005), a higher perceptual sensitivity for facial displays of anger (Jusyte and Schönenberg, 2013), an attentional bias toward threatening information (Bar-Haim et al., 2007; Armstrong and Olatunji, 2012), as well as negative interpretation biases for ambiguous social information (Mobini et al., 2013).

During social interactions, facial expressions represent one of the most important information sources in the ongoing stream of various social cues. However, due to the complex and dynamic nature, facial affect has a high potential for ambiguity and is naturally prone to underlie a biased interpretation of the beholder. Socially anxious individuals are particularly sensitive to facial cues that may signal contempt or disapproval, such as anger or disgust, which can act as anxiety-provoking triggers. Thus, a negatively biased interpretation of ambiguous social cues can represent a starting point of a ruminative spiral that elicits feelings of incompetence and anxiety during social interactions in gSAD (Amir et al., 2010).

The assumption that social anxiety may be related to a biased perception of facial affect have been put to the test by several experimental studies which attempted to investigate interpretation biases using ambiguous sentences (Moser et al., 2008; Beard and Amir, 2009, 2010; Amir et al., 2012) or short ambiguous descriptions of events/social scenes (Heinrichs and Hofman, 2001; Clark and McManus, 2002; Hirsch and Clark, 2004), with the majority of evidence supporting a bias toward threatening interpretation in gSAD. Several studies have also examined the interpretative bias in faces by manipulating the stimulus intensity (blends between neutral/emotional facial expressions) and asking the subjects to identify the emotional expression or to rate the stimulus valence. This line of studies has yielded equivocal results: some authors report enhanced identification of negative facial expressions in anxious populations, (Winton et al., 1995; Joormann

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and Gotlib, 2006; Rossignol et al., 2007; Frenkel and Bar-Haim, 2011), while others report conflicting findings (Mullins and Duke, 2004; Philippot and Douilliez, 2005; Montagne et al., 2006; Schofield et al., 2007; Stevens et al., 2008; Kolassa et al., 2009; Heuer et al., 2010; Bell et al., 2011). This may be due to methodological differences between studies regarding the sample population (clinical (Philippot and Douilliez, 2005; Joormann and Gotlib, 2006; Stevens et al., 2008; Kolassa et al., 2009; Bell et al., 2011) vs. subclinical sample (Mullins and Duke, 2004; Rossignol et al., 2007; Schofield et al., 2007; Heuer et al., 2010; Frenkel and Bar-Haim, 2011)), or the type of assessment/paradigm. For instance, some studies employed static facial expressions (e.g. Mullins and Duke, 2004; Rossignol et al., 2007; Stevens et al., 2008; Kolassa et al., 2009; Bell et al., 2011; Frenkel and Bar-Haim, 2011), while others used animated clips with changing facial expression (Joormann and Gotlib, 2006; Montagne et al., 2006; Heuer et al., 2010). Further differences in the stimulus material, such as the use of schematic vs. real faces, or the temporal task characteristics, such as long (e.g., Joormann and Gotlib, 2006) vs. short (e.g., Montagne et al., 2006) presentation, may partly explain the heterogeneity of the obtained findings.

These previously mentioned studies utilized blends between neutral and emotional facial expressions, which is appropriate for the investigation of general decoding abilities of emotional expressions. However, manipulation of affective intensity may not be the ideal approach to investigate interpretative biases, as this may reflect perceptual sensitivity rather than interpretative processes (Wilkowski and Robinson, 2012). The employment of ambiguous faces containing conflicting information, e.g., a mix between an angry and a happy expression, bears a potential to appropriately unravel interpretative biases which should be evident in the predominantly negative judgements of such stimuli. Only few studies to date have employed blends of different emotional expressions in schematic (Coles et al., 2008) or naturalistic faces (Richards et al., 2002; Blanchette et al., 2007). Richards et al. (2002) presented their high and low anxious (HSA/LSA) participants with ambiguous facial expressions and found no evidence for increased anger judgments associated with trait anxiety. Coles et al. (2008) found partial support for a negative interpretation bias in HSA using ambiguous schematic stimuli, while Blanchette et al. (2007) failed to demonstrate effects of trait anxiety in the judgement of ambiguous faces.

Taken together, a number of studies have investigated and brought evidence for a biased attentional allocation toward threatening cues in gSAD (Bar-Haim et al., 2007; Armstrong and Olatunji, 2012). However, less is known about the relationship between anxious psychopathology and the interpretation of ambiguous facial expressions, which, unlike the full-blown unambiguous expressions, may reflect more accurately the facial expressions one encounters in real-life interactions. A biased interpretation of ambiguous facial expressions may be crucial for the appraisals and interpretation of our social partner's intent. Hence, the investigation of this issue may have both clinical and theoretical relevance.

The aim of the current study was to examine a threat-related interpretation bias in a population of gSAD individuals using ambiguous facial stimuli. We employed an experimental paradigm previously developed in our work group (Schönenberg and Jusyte, 2014) in which participants judged the predominant emotional expression of different emotional blends. The participants rated each of these ambiguous expressions according to the most dominant emotion as well as the perceived intensity. For this purpose we utilized blends between happy and angry, angry and fearful, as well as fearful and happy expressions. Based on previous literature indicating an altered processing of angry faces in gSAD (Staugaard, 2010), we reasoned that an interpretative bias toward

threat should be reflected in a tendency to label ambiguous angry/happy blends as angry. Several studies have demonstrated that individuals with gSAD may be prone to an altered processing of other expressions signaling social threat such as fear (Ewbank et al., 2009; Mogg et al., 2007; Rossignol et al., 2007; Thomas et al., 2001) or disgust (Rossignol et al., 2007). Hence, we included a set of emotional blends between fearful and happy expressions in order to clarify whether a postulated interpretative bias would be evident in another variant of social threat. Finally, angry/fearful blends were included in order to investigate which aspect of social threat – direct (angry face) or indirect (fear) – may be associated with an interpretative bias in social anxiety. We expected an interpretative bias to be reflected in an increased number of 'angry' responses for the angry–happy blends in gSAD participants. An increased number of 'angry' responses for the angry–fearful blends and no response tendencies for the fearful–happy blends in the gSAD group would indicate that the interpretative bias is restricted to facial displays of direct threat. An interpretative bias in the gSAD group was also expected to be associated with higher subjective intensity ratings for the biased emotion category.

2. Methods

2.1. Participants and procedure

Participants were recruited via our University's mailing list addressing all undergraduate students. The announcement specified that we sought individuals who either experience anxiety in social interactions or have no interactional difficulties. Interested individuals were invited to our institute's laboratory where they all completed several surveys assessing the self-reported dimensional severity of social anxiety. The *Social Interaction Anxiety Scale* (SIAS) (Mattick and Clarke, 1998) assessed the anxiety experienced in social interactional situations; the *Social Phobia Scale* (SPS) (Mattick and Clarke, 1998; Stangier et al., 1999) was employed to measure levels of anxiety when individuals are scrutinized by others, and the *Liebowitz Social Anxiety Scale* (LSAS) (Liebowitz, 1987; Stangier et al., 2003) was used to assess the range of social interaction and performance situations that social phobics may fear/avoid. A structured interview (Mini International Neuropsychiatric Interview, MINI (Sheehan et al., 1998)) was also administered in order to validate the clinical diagnosis of gSAD and to exclude psychiatric morbidity in healthy controls. The interview was carried out by trained postgraduate psychologists who had extensive experience in conducting clinical interviews. Participants who had a history of or current disorder of the schizophrenic or bipolar/manic spectrum, a diagnosis of borderline or antisocial personality disorder, or did not meet the criteria for a categorical gSAD diagnosis were excluded from participation. Exclusion criteria for healthy controls (HC) were current psychopathology or a history thereof. Four participants from the gSAD group were excluded because they did not fulfill the criteria for a categorical gSAD diagnosis and one due to a history of psychosis. Three healthy controls were excluded due to current misuse of stimulant substances and one due to current depression. The final sample consisted of 64 participants, with 32 gSADs aged 19–33 ($M=24.34$, $S.D.=3.57$; 23 females) and 32 healthy controls aged 18–34 ($M=23.72$, $S.D.=3.31$; 22 females) years. All participants provided written informed consent and received monetary compensation for participation. The study was approved by the local ethics committee and was conducted in accordance with the Declaration of Helsinki.

2.2. Ambivalence task

2.2.1. Stimuli

Digitalized photographs of affective expressions (angry, happy, fearful) of three male model identities were selected from the Radboud Faces Database (Langner et al., 2010) based on the accuracy ratings of emotional expressions. To create the stimulus material, these photographs were first cropped and adjusted for color and luminance (Adobe Photoshop CS4). Affective displays of each model identity were then blended (FantaMorph software, Abrosoft, Beijing, China) into each other to create three continuous affective dimensions (happy–fearful, happy–angry, fearful–angry). The level of ambiguity was manipulated by creating five distinct intensity levels containing different amounts of each blended emotion, e.g.: 90% angry and 10% happy, 70% angry and 30% happy, 50% angry and 50% happy (maximal ambiguity), 30% angry and 70% happy and a 10% angry, 90% happy. Hence, the stimulus material for the experiment consisted of 45 distinct images (three model identities $\times$ three emotional dimensions $\times$ five intensity levels). A separate set of 15 stimuli (three emotional dimensions $\times$ five intensity levels) was created in the same manner for the practice trials using one additional model identity.

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